EXHIBIT 7

PTO/SB/05 (04-05)
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U.S. Patent and Trademark Office. U.S. DEPARTMENT OF COMMERCE

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	26.2.D84/USA
First Inventor	Chad L. Moe
Title	ROTARY CUTTING DECK HAVING REAR..
Express Mail Label No.	EQ651557046US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☐ **Fee Transmittal Form** (e.g., PTO/SB/17)
   (Submit an original and a duplicate for fee processing)
2. ☐ **Applicant claims small entity status.** See 37 CFR 1.27.
3. ☑ **Specification** [*Total Pages* 15]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP 608.01(a))
4. ☑ **Drawing(s)** (*35 U.S.C. 113*) [*Total Sheets* 5]
5. **Oath or Declaration** [*Total Sheets* _____]
   a. ☐ Newly executed (original or copy)
   b. ☐ A copy from a prior application (37 CFR 1.63(d))
   (for continuation/divisional with Box 18 completed)
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)*
   ☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. – c. are required)
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

ADDRESS TO: **Commissioner for Patents**
P.O. Box 1450
Alexandria VA 22313-1450

ACCOMPANYING APPLICATION PARTS

9. ☐ **Assignment Papers** (cover sheet & document(s))
   Name of Assignee _____
10. ☐ **37 CFR 3.73(b) Statement** *(when there is an assignee)* ☐ **Power of Attorney**
11. ☐ **English Translation Document** *(if applicable)*
12. ☐ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
13. ☐ **Preliminary Amendment**
14. ☑ **Return Receipt Postcard** (MPEP 503)
    (Should be specifically itemized)
15. ☐ **Certified Copy of Priority Document(s)**
    (if foreign priority is claimed)
16. ☑ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. ☐ Other: _____

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: .....

Prior application information: *Examiner* _____ *Art Unit:* _____

19. CORRESPONDENCE ADDRESS

☑ The address associated with Customer Number: 611145 *OR* ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	James W. Miller	Date	6/15/06
Name (Print/Type)	James W. Miller	Registration No. (Attorney/Agent)	27,661

PTO/SB/35 (09-04)
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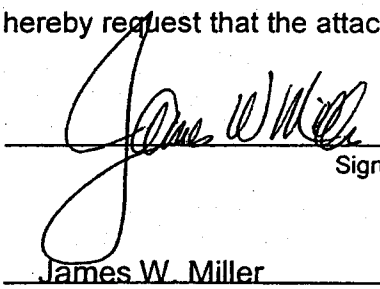
NONPUBLICATION REQUEST UNDER 35 U.S.C. 122(b)(2)(B)(i)		
	First Named Inventor	Chad L. Moe
	Title	ROTARY CUTTING DECK HAVING REAR DISCHARGE OF GRASS...
	Attorney Docket Number	26.2.D84/USA

I hereby certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.

I hereby request that the attached application not be published under 35 U.S.C. 122(b).



Signature

5/15/06
Date

James W. Miller
Typed or printed name

27,661
Registration Number, if applicable

612-338-5915
Telephone Number

This request must be signed in compliance with 37 CFR 1.33(b) and submitted with the application **upon filing.**

Applicant may rescind this nonpublication request at any time. If applicant rescinds a request that an application not be published under 35 U.S.C. 122(b), the application will be scheduled for publication at eighteen months from the earliest claimed filing date for which a benefit is claimed.

If applicant subsequently files an application directed to the invention disclosed in the attached application in another country, or under a multilateral international agreement, that requires publication of applications eighteen months after filing, the applicant **must** notify the United States Patent and Trademark Office of such filing within forty-five (45) days after the date of the filing of such foreign or international application. **Failure to do so will result in abandonment of this application (35 U.S.C. 122(b)(2)(B)(iii)).**

ROTARY CUTTING DECK HAVING REAR DISCHARGE OF GRASS CLIPPINGS OVER A REAR ROLLER

Technical Field

[001] This invention relates to a mower for cutting grass. More particularly, this invention relates to a rotary cutting deck for such a mower that discharges grass clippings rearwardly over a ground engaging rear roller.

Background of the Invention

[002] In the art of mowing grass, rotary cutting decks are known having a cutting blade that rotates about a vertical axis in a horizontal cutting plane. The cutting blade cuts grass and circulates the grass clippings within a cutting chamber until the clippings exit the cutting chamber. In a mulching cutting deck, the cutting chamber is enclosed around its periphery to force the clippings to exit vertically downwardly from the chamber. In a discharge cutting deck such as a side or rear discharge deck, the periphery of the cutting chamber includes a grass discharge outlet allow the grass clippings to exit the cutting deck substantially horizontally.

[003] Some rotary cutting decks are at least partially supported for rolling over the ground by a rear roller that extends over the full width of the cutting deck. Some cutting decks that use a rear roller are also rear discharge decks. In these decks, the grass clippings are often discharged unevenly across the width of the rear roller. In other words, the distribution of the grass clippings will tend to be substantially more dense on the side of the rear roller closest to where the grass clippings release from the

cutting chamber than on the opposite side of the rear roller.

[004] This uneven lateral distribution of grass clippings relative to the rear roller can cause the grass clippings to discharge in a windrow or in clumps behind the cutting deck. This is obviously undesirable. In addition, buildup of grass clippings on the surface of the rear roller is far more likely to occur with an uneven clipping distribution in which relatively larger amounts of clippings end up passing over a narrow lateral portion of the roller. Clippings that are mulched and discharge under the roller are also more likely to build up on the roller and clump. This requires the operator to stop and clean the rear roller periodically or to install some type of roller scraper on the cutting deck in an attempt to keep the rear roller relatively clean.

[005] U.S. Patent 6,470,663 to Langworthy et al., assigned to the assignee of this invention, discloses a rotary cutting deck having a rear roller where the grass clippings discharge rearwardly from the cutting deck. The Langworthy patent discloses a vertical vane in the discharge path of the grass clippings to try and help promote a more even lateral distribution of grass clippings. However, placing any vertical object, such as a vane, within the stream of grass clippings provides a forward edge and a pair of side surfaces on which the grass clippings can collect, particularly if the clippings are wet or long. Accordingly, the vane approach to evening out the distribution of the clippings presents its own disadvantages.

[006] It would be an advance in the mower art to provide a rotary cutting deck that would discharge grass clippings in a substantially even and uniform lateral distribution along the width of a rear roller without presenting additional edges or surfaces on which the grass clippings could collect.

Summary of the Invention

[007] One aspect of this invention relates to a rotary cutting deck for carrying a horizontally rotating cutting blade for mowing grass. The cutting deck comprises a cutting chamber defined by various walls of the cutting deck comprising a top wall and a peripheral wall that extends downwardly from the top wall. The cutting chamber has a predetermined width. A rear roller is carried on the cutting deck behind the cutting chamber with the rear roller supporting a rear end of the cutting deck for rolling over the ground. The rear roller has a width that extends substantially across the width of the cutting chamber. The peripheral wall of the cutting chamber includes a front portion that extends across a substantial portion of the width of the cutting chamber and a rear portion that extends towards the rear roller from one end of the peripheral wall front portion. The peripheral wall front portion is deep enough to substantially radially confine grass clippings that have been cut and thrown against the peripheral wall front portion by the operation of the blade. The peripheral wall rear portion has an arcuate section that substantially progressively decreases in depth to progressively radially release the clippings along a plurality of tangents to the peripheral wall rear portion which tangents cross over the rear roller at progressively further distances along the width of the rear roller. Thus, the grass clippings have a generally uniform lateral distribution relative to that portion of the rear roller crossed by the tangents.

[008] Another aspect of this invention relates to a rotary cutting deck for carrying a horizontally rotating cutting blade for mowing grass. The cutting deck comprises a cutting chamber defined by various walls of the cutting deck comprising a top wall and an arcuate peripheral wall

that extends downwardly from the top wall. The cutting chamber has a predetermined width. A rear roller is carried on the cutting deck behind the cutting chamber with the rear roller supporting a rear end of the cutting deck for rolling over the ground. The rear roller has a width that extends substantially across the width of the cutting chamber. The peripheral wall of the cutting chamber has a generally semi-circular front half and an arcuate rear portion that extends towards the rear roller from one end of the peripheral wall front half. The peripheral wall front half has a depth sufficient to substantially radially confine grass clippings that have been cut and thrown against the peripheral wall front half by the operation of the blade. The peripheral wall rear portion has a section that substantially progressively decreases in depth by at least 50% in an angular arc of less than 90° of blade rotation.

[009] Yet another aspect of this invention relates to a rotary cutting deck for a mower. The cutting deck comprises a cutting chamber formed by a top wall and an arcuate peripheral wall. A trailing rear roller behind the cutting chamber extends across the cutting chamber. The peripheral wall has a front portion that is deep enough to radially confine grass clippings within the cutting chamber. The peripheral wall has a rear portion with a rear discharge opening. The peripheral wall has an upwardly sloped lower edge that forms a leading edge of the rear discharge opening with the slope of the lower edge being steep enough and long enough to permit the grass clippings to pass through the rear discharge opening and be substantially evenly and uniformly distributed in a lateral direction over the trailing rear roller.

Brief Description of the Drawings

[010] This invention will be described hereafter in the Detailed Description, taken in conjunction with the following drawings, in which like reference numerals refer to like elements or parts throughout.

[011] Fig. 1 is a top plan view of a rotary cutting deck according to this invention;

[012] Fig. 2 is a bottom plan view of the rotary cutting deck of Fig. 1;

[013] Fig. 3 is a rear elevational view of the rotary cutting deck of Fig. 1;

[014] Fig. 4 is a perspective view of the underside of the rotary cutting deck of Fig. 1; and

[015] Fig. 5 is a cross-sectional view of the rotary cutting deck of Fig. 1, taken along lines 5-5 in Fig. 1.

Detailed Description

[016] One embodiment of a rotary cutting deck according to this invention is illustrated generally as 2 in Figs. 1-5. Deck 2 is a rotary cutting deck of the same type as disclosed in U.S. Patent 6,470,663 to Langworthy et al. which is assigned to The Toro Company, the assignee of this invention. The Langworthy patent is hereby incorporated by reference. Insofar as is relevant to this invention, deck 2 differs from the deck of the Langworthy patent in how deck 2 discharges grass clippings rearwardly from deck 2 with a substantially uniform, even lateral distribution.

[017] Deck 2 includes a top wall 4 and a peripheral wall 6 that extends downwardly from top wall 4 to form a cutting chamber 8. Peripheral wall 6 and thus cutting chamber 8 have a generally circular shape that encompasses the orbit of a cutting blade 10. Blade 10 rotates in a general-

ly horizontal cutting plane about a generally vertical rotational axis 12. As blade 10 rotates in the direction indicated by the arrow X in Figs. 1 and 2, grass is cut by sharpened edges 14 of blade 10 and the grass clippings generated by this cutting action are confined by peripheral wall 6 so as to circulate within cutting chamber 8 in a circumferential path.

[018] A pair of front rollers 16 support the front of deck 2 for rolling over the ground. A single rear roller 18 supports the rear of deck 2 for rolling over the ground. Rear roller 18 is located behind cutting chamber 8 and extends over the full width of cutting chamber 8. See Fig. 2. A gap 20 is provided between the top of rear roller 18 and the underside of top wall 4 of deck 2. See Fig. 5.

[019] The rear of top wall 4 of deck 2 forms a downwardly curved shroud or baffle 22 located behind rear roller 18. The lower edge 24 of baffle 22 is approximately at the same height as the top of rear roller 18 though this will vary depending upon the height of cut. In addition, lower edge 24 is contoured as shown in Fig. 3 to allow deck 2 to pass a foot probe test. Baffle 20 deflects the grass clippings passing rearwardly through gap 20 downwardly towards the cut grass path behind deck 2 after the clippings pass over the rear roller.

[020] Referring now to Fig. 2, peripheral wall 6 of cutting chamber 8 has a generally semi-circular front half 26 and a generally semi-circular rear half 28 which abut along their diameters. Cutting chamber 8 can be divided into four 90° quadrants Q1, Q2, Q3 and Q4 as shown in Fig. 2. Peripheral wall front half 26 forms the front two quadrants Q1 and Q2 of cutting chamber 8 from 0° to 180° and peripheral wall rear half 28 forms the rear two quadrants Q3 and Q4 of cutting chamber 8 from 180° to 360° when 0° (or 360°) is the position of blade 10 as shown in Fig. 2 at the beginning of a cutting pass through cutting chamber 8.

Peripheral wall front half 26 is proximate to front rollers 16 and peripheral wall rear half 28 is proximate to and in front of rear roller 18.

[021] Peripheral wall front half 26 has a depth that is sufficient to prevent the grass clippings from exiting horizontally or radially from the front two quadrants Q1 and Q2 of cutting chamber 8. This depth need not be uniform as front cutouts 30 shown in Fig. 5 are preferably provided to expose standing, uncut grass to cutting edges 14 of blade 10. It is simply necessary that the depth of peripheral wall front half 26 be generally sufficient so that the grass clippings generated by rotation of blade 10 in front quadrants Q1 and Q2, which clippings are thrown against and circulated along peripheral wall front half 26 by the action of blade 10, be substantially radially retained in cutting chamber 8 by peripheral wall front half 26.

[022] On the other hand, peripheral wall rear half 28 is designed to substantially progressively and evenly release the grass clippings from cutting chamber 8 along a series of different tangents A-G that progressively cross over rear roller 18 at further and further distances along the width of rear roller 18. See Fig. 2. This effects a substantially uniform and even distribution of grass clippings along the width of rear roller 18.

[023] To effect the desired distribution of grass clippings, peripheral wall rear half 28 begins to decrease in height at a relatively steep angle α of approximately 25°. See Fig. 5. This height decrease starts approximately at or slightly after the beginning of peripheral wall rear half 28, at about 190°-200° or so in the rotation of blade 10. This height decrease is indicated visually in Figs. 4 and 5 by the upwardly sloped lower edge 32 of peripheral wall rear half 28. In effect, sloped lower edge 32 forms an upwardly sloped leading edge of a rear discharge opening 34 provided in peripheral wall rear half 28.

[024] As can be seen in Figs. 4 and 5, the depth of peripheral wall rear half 28 decreases substantially uniformly over the length of sloped lower edge 32 from a beginning depth of about 5 inches to an ending depth of about 3/4 of an inch. In addition, this decrease in depth takes place relatively quickly within an arc ß of about 60°. Thus, the sloped lower edge 32 begins at about °190°-200° in the rotation of blade 10 and ends at about 250°-260° in the rotation of blade 10. As shown in Fig. 2, sloped lower edge 32 is thus located entirely within the third quadrant Q3 of cutting chamber 8. In addition, sloped lower edge 32 horizontally overlies a portion d of rear roller 18 that is on the near side of rear roller and that is less than half of the width of rear roller 18, i.e. a portion d that is approximately the first third of the width of rear roller 18.

[025] Referring again to Fig. 2, as the grass clippings pass from peripheral wall front half 26 to peripheral wall rear half 28, such clippings soon come to the sloped lower edge 32 of peripheral wall rear half 28 and thus to the leading edge of rear discharge opening 34. The clippings are evenly released by sloped lower edge 32 along an infinite series of tangents that are represented only diagrammatically by the seven tangents A-G. The slope of lower edge 32 and the angular extent and placement of lower edge 32 within the third quadrant Q3 are chosen so that these tangents substantially evenly distribute the grass clippings over substantially the entire width of rear roller 18. In other words, the grass clippings are NOT distributed more heavily over any particular lateral section of rear roller 18, but are instead distributed in substantially equal amounts over equal sized lateral sections of rear roller 18. Of course, the described substantially even distribution of grass clippings holds true for assumed idealized grass conditions comprising cutting grass with a moderate

moisture content and grass that is not unduly long at moderate heights of cut.

[026] The even and uniform lateral distribution of grass clippings by sloped lower edge 32 helps to prevent unsightly windrowing or clumping of the grass clippings behind deck 2. It also promotes the smooth flow of the grass clippings through gap 20 between the top of rear roller 18 and the underside of top wall 4. This helps prevent rear roller 18 from becoming caked or fouled with grass clippings since the grass clippings are not discharged in a batch over a single narrow lateral section of rear roller 18.

[027] Following the sloped lower edge, peripheral wall rear half 28 has a trailing section 36 that retains a small generally constant depth all the way back to the beginning of peripheral wall front half 26. Such a trailing section 36 in peripheral wall rear half 28 helps retain very light grass clippings in cutting chamber 8 until such grass clippings drop out of cutting chamber 8 through the open bottom face of cutting chamber 8. However, trailing section 36 could be removed if desired without substantially affecting the even lateral distribution of grass clippings across the full width of rear roller 18. In this case, peripheral wall rear half 28 would be reduced from a semi-circular half to only an arcuate section from 180° to about 250°-260° that extends rearwardly toward rear roller 18 from the end of peripheral wall front half 26.

[028] Various modifications other than those described above will be apparent to those in the art. Thus, this invention will be limited only by the appended claims.

WE CLAIM:

1. A rotary cutting deck for carrying a horizontally rotating cutting blade for mowing grass, which comprises;

(a) a cutting chamber defined by various walls of the cutting deck comprising a top wall and a peripheral wall that extends downwardly from the top wall, wherein the cutting chamber has a predetermined width;

(b) a rear roller carried on the cutting deck behind the cutting chamber with the rear roller supporting a rear end of the cutting deck for rolling over the ground, wherein the rear roller has a width that extends substantially across the width of the cutting chamber; and

(c) wherein the peripheral wall of the cutting chamber includes a front portion that extends across a substantial portion of the width of the cutting chamber and a rear portion that extends towards the rear roller from one end of the peripheral wall front portion, wherein the peripheral wall front portion is deep enough to substantially radially confine grass clippings that have been cut and thrown against the peripheral wall front portion by the operation of the blade, and wherein the peripheral wall rear portion has an arcuate section that substantially progressively decreases in depth to progressively radially release the clippings along a plurality of tangents to the peripheral wall rear portion which tangents cross over the rear roller at progressively further distances along the width of the rear roller, whereby the grass clippings have a generally uniform lateral distribution relative to that portion of the rear roller crossed by the tangents.

2. The cutting deck of claim 1, wherein the decreasing depth arcuate section of the peripheral wall rear portion decreases in depth by at least 50%

3. The cutting deck of claim 2, wherein the decreasing depth arcuate section of the peripheral wall rear portion decreases in depth by approximately at least 80%

4. The cutting deck of claim 2, wherein the decreasing depth arcuate section of the peripheral wall rear portion has an angular extent of less than 90° taken with respect to one complete revolution of the blade within the cutting chamber.

5. The cutting deck of claim 4, wherein the cutting chamber may be divided into first, second, third and fourth quadrants with respect to the direction of rotation of the blade beginning when the blade is perpendicular to a forward direction of motion of the cutting deck with a cutting edge of the blade facing forwardly, wherein the peripheral wall front portion is in the first and second quadrants of the cutting chamber, and wherein the decreasing depth arcuate section of the peripheral wall rear portion is in the third quadrant of the cutting chamber.

6. The cutting deck of claim 1, wherein the peripheral wall front portion extends substantially across the entire width of the cutting chamber.

7. The cutting deck of claim 6, wherein the peripheral wall front portion has a substantially semi-circular shape.

8. The cutting deck of claim 6, wherein the peripheral wall rear portion also extends substantially across the entire width of the cutting chamber.

9. The cutting deck of claim 8, wherein the peripheral wall rear portion has a trailing section following the

decreasing depth arcuate section, wherein the trailing section of the peripheral wall rear portion has a relatively small depth continuing back substantially to an opposite end of the peripheral wall front portion.

10. The cutting deck of claim 2, wherein the peripheral wall front and rear portions are substantially semi-circular halves that abut with one another to form a substantially circular peripheral wall and cutting chamber.

11. The cutting deck of claim 1, wherein the decreasing depth arcuate section of the peripheral rear wall portion is configured so that the tangents cross over substantially the entire width of the rear roller.

12. A rotary cutting deck for carrying a horizontally rotating cutting blade for mowing grass, which comprises;

(a) a cutting chamber defined by various walls of the cutting deck comprising a top wall and an arcuate peripheral wall that extends downwardly from the top wall, wherein the cutting chamber has a predetermined width;

(b) a rear roller carried on the cutting deck behind the cutting chamber with the rear roller supporting a rear end of the cutting deck for rolling over the ground, wherein the rear roller has a width that extends substantially across the width of the cutting chamber;

(c) wherein the peripheral wall of the cutting chamber has a generally semi-circular front half and an arcuate rear portion that extends towards the rear roller from one end of the peripheral wall front half;

(d) wherein the peripheral wall front half has a depth sufficient to substantially radially confine grass clippings that have been cut and thrown against the peripheral wall front half by the operation of the blade; and

(e) wherein the peripheral wall rear portion has a section that substantially progressively decreases in depth by at least 50% in an angular arc of less than 90° of blade rotation.

13. The cutting deck of claim 12, wherein the decreasing depth section of the peripheral wall rear portion overlies a portion of one side of the rear roller that is less than half the width of the rear roller.

14. The cutting deck of claim 12, wherein the decreasing depth section of the peripheral wall rear portion decreases in depth by at least 80%.

15. The cutting deck of claim 12, wherein the decreasing depth section of the peripheral wall rear portion decreases has an angular extent of approximately 60°.

16. The cutting deck of claim 12, wherein the peripheral wall rear portion comprises a generally semi-circular rear half.

17. The cutting deck of claim 16, wherein the peripheral wall rear half includes a trailing section that joins the decreasing depth section of the peripheral wall rear half to an opposite end of the peripheral wall front half.

18. The cutting deck of claim 17, wherein the trailing section of the peripheral wall rear half has a generally constant depth substantially equal to a smallest depth of the decreasing height section located at a trailing end of the decreasing height section.

19. A rotary cutting deck for a mower, which comprises:

(a) a cutting chamber formed by a top wall and an arcuate peripheral wall;

(b) a trailing rear roller behind the cutting chamber extending across the cutting chamber;

(c) wherein the peripheral wall has a front portion that is deep enough to radially confine grass clippings within the cutting chamber;

(d) wherein the peripheral wall has a rear portion with a rear discharge opening, the peripheral wall having an upwardly sloped lower edge that forms a leading edge of the rear discharge opening with the slope of the lower edge being steep enough and long enough to permit the grass clippings to pass through the rear discharge opening and be substantially evenly and uniformly distributed in a lateral direction over the trailing rear roller.

Abstract of the Disclosure

A rotary cutting deck for a mower has a cutting chamber formed by a top wall and an arcuate peripheral wall. The peripheral wall has a front portion that is deep enough to radially confine grass clippings within the cutting chamber. The peripheral wall has a rear portion with a rear discharge opening. The peripheral wall has an upwardly sloped lower edge that forms a leading edge of the rear discharge opening. The slope of the lower edge is steep enough and long enough to permit the grass clippings to pass through the rear discharge opening and be substantially evenly and uniformly distributed in a lateral direction over a rear roller that trails the cutting chamber.

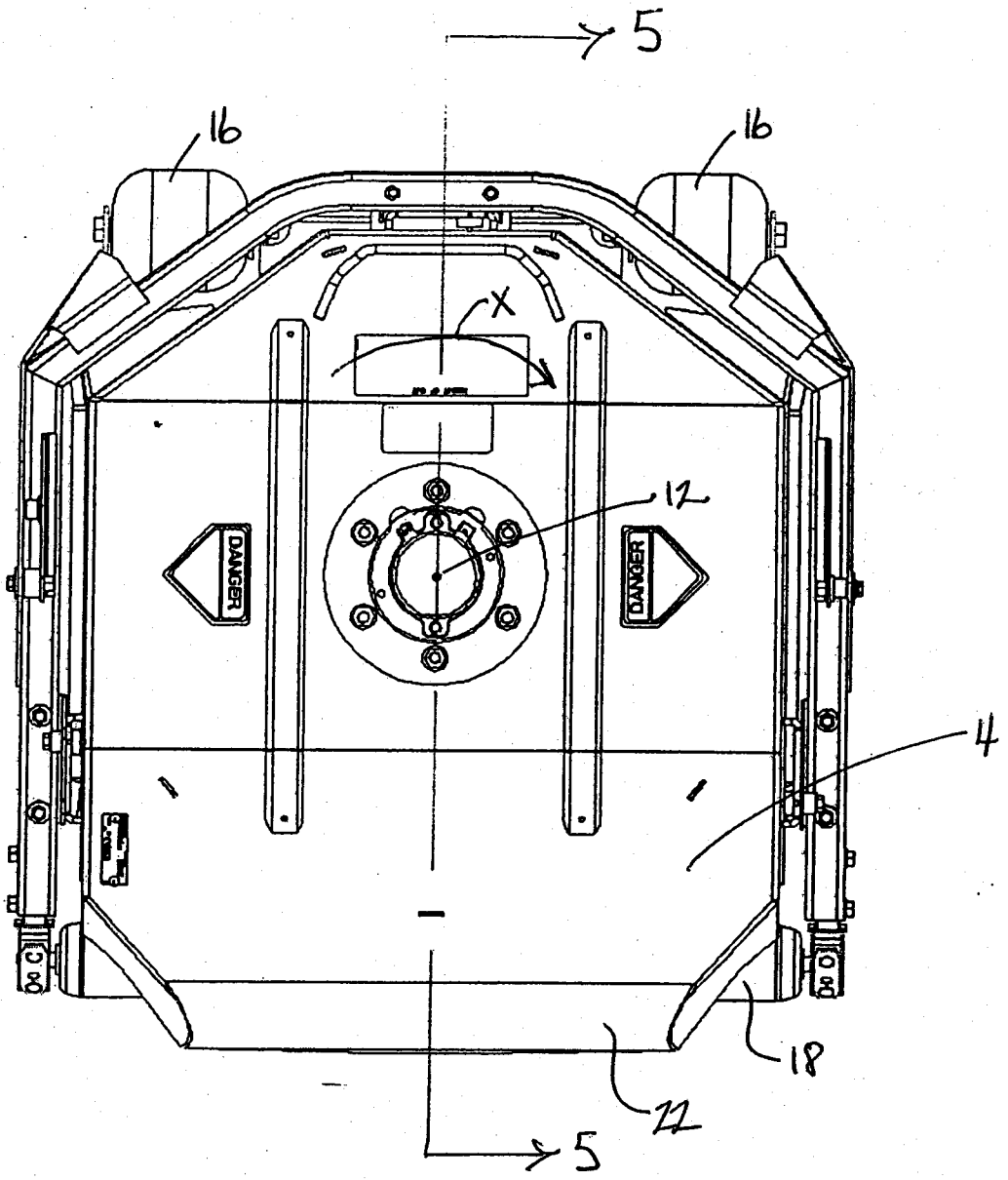


FIG. 1

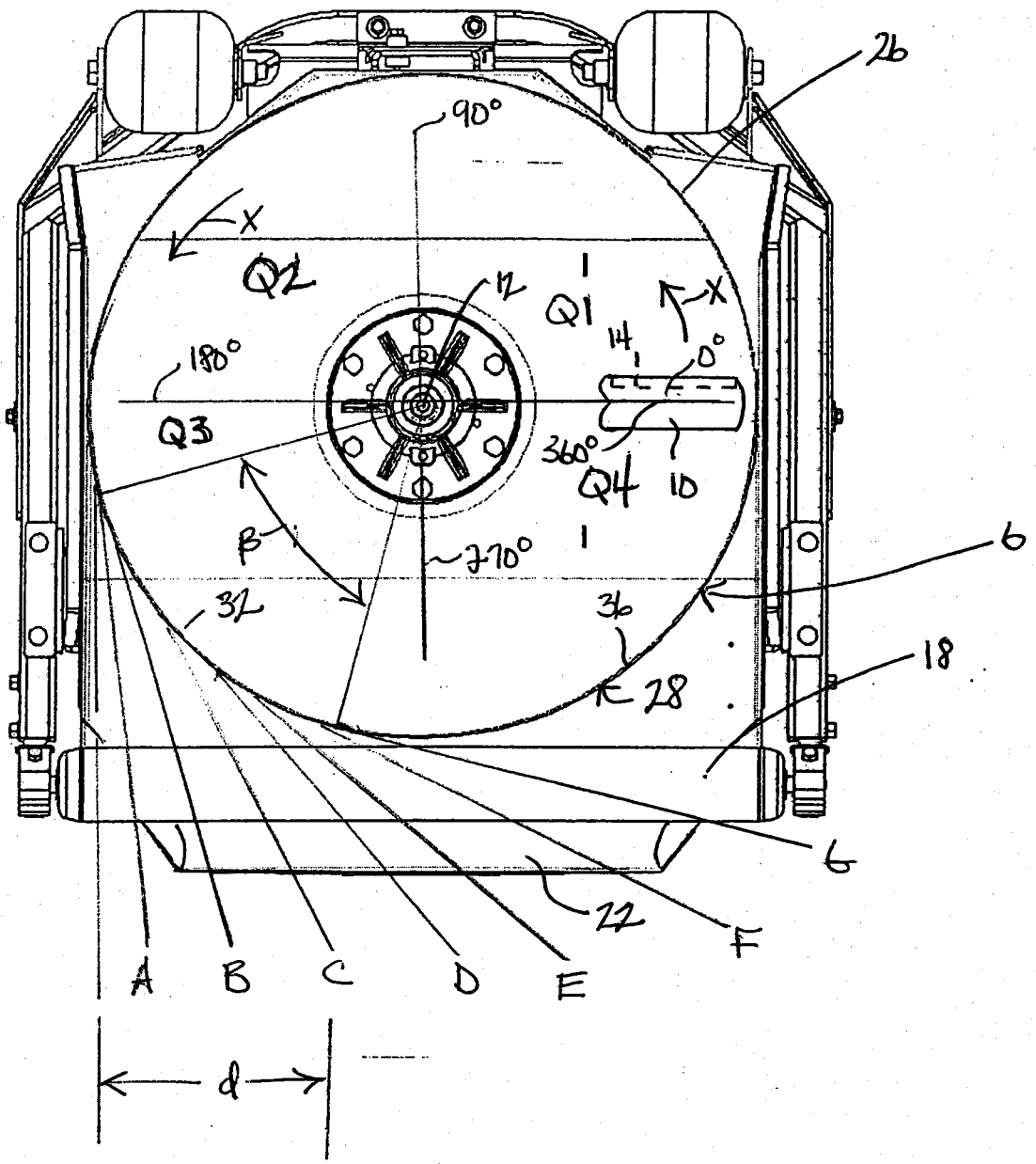

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FIG. 2

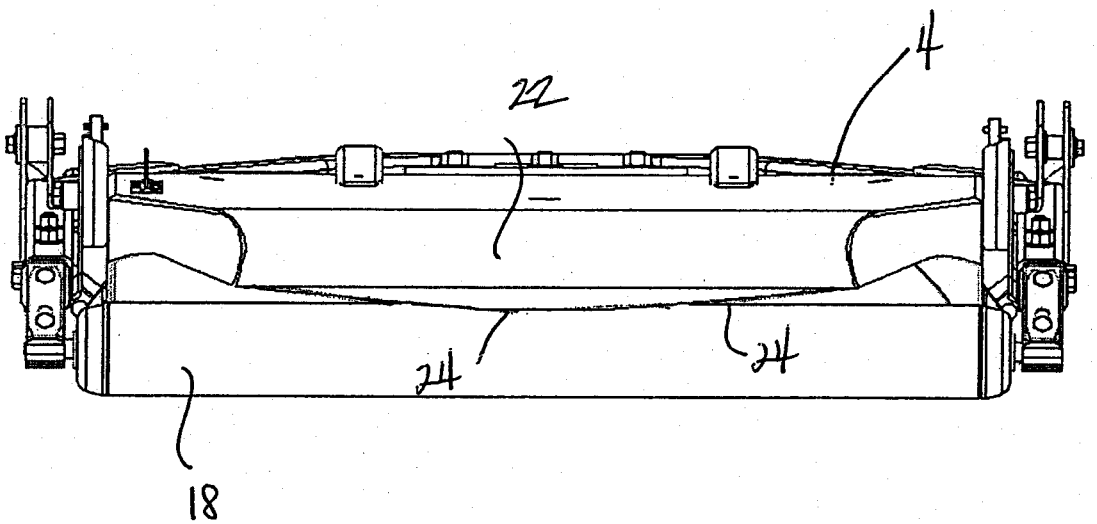

FIG. 3

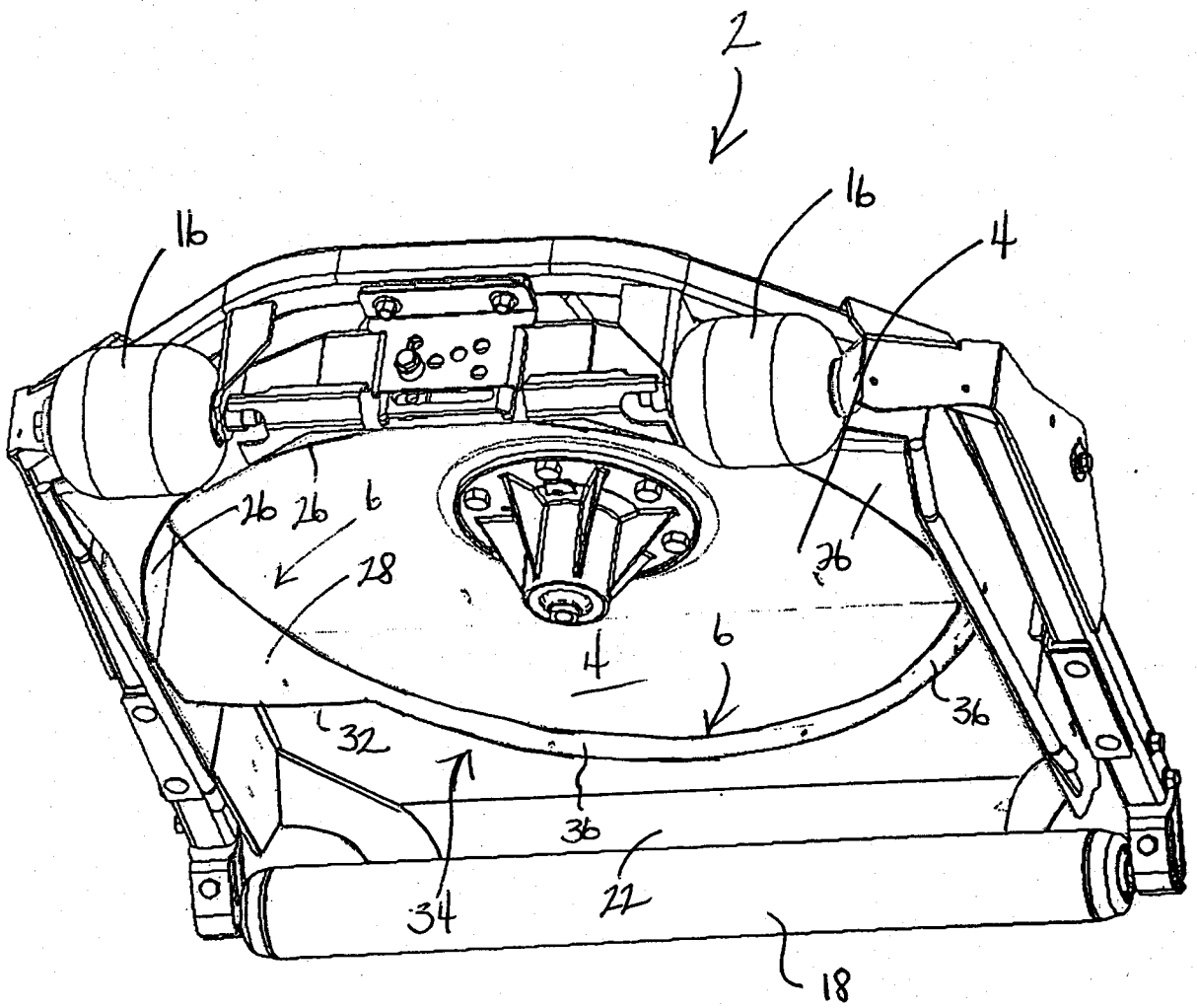

FIG. 4

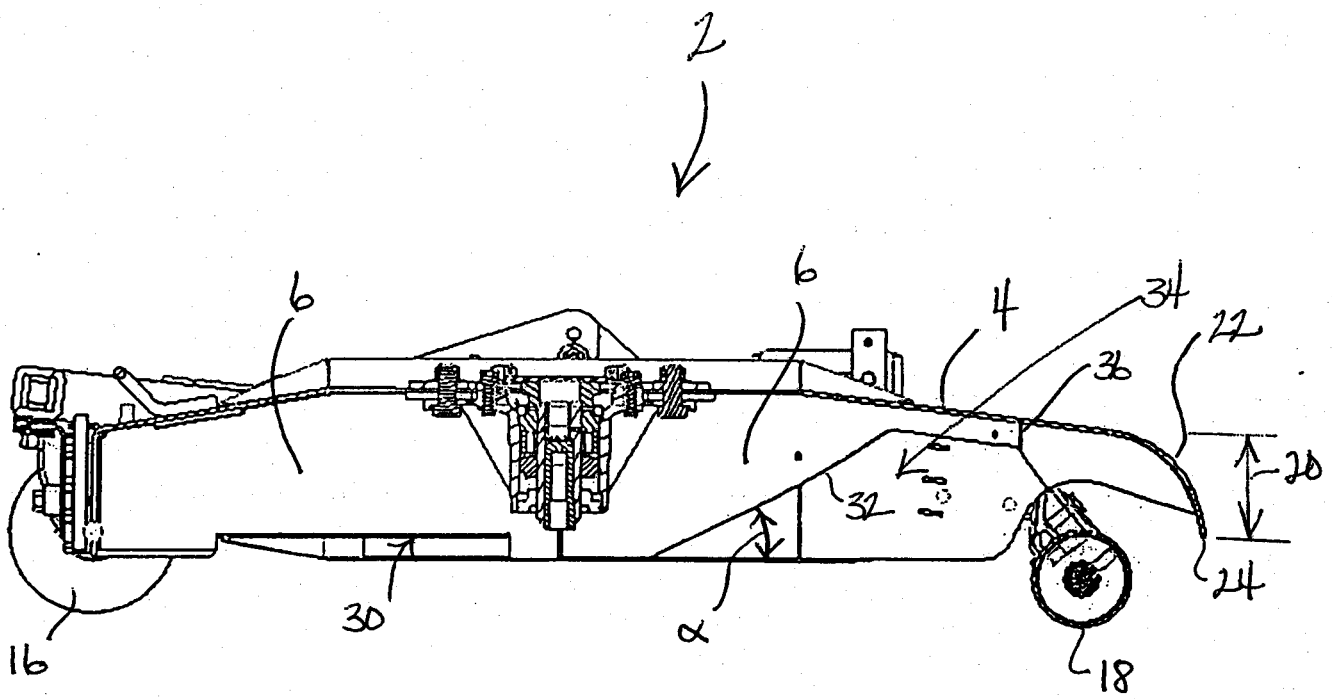

FIG. 5